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Secure Digital Voting System Based on Block chain Technology

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Abstract

Voting is critical in a republic for opting a government and should be open, free, and accessible to all. numerous countries use ballots or EVMs for the election process, but these aren't fully tamper- evidence and are prone to faults and wrongdoing; still, online voting systems are fairly safe, although they aren't fully tamper- evidence and can be hackable. Block chain finds its operation in similar cases because block chain is a decentralized system and the blocks of data are related and connected. Any change in this connection can be detected and corrected, the bank of votes can be kept safe, and an accurate result can be declared.

In this design, the development design of an electronic voting system using blockchain technology is applied. The two- position armature provides a secure voting process without the redundancy of being (not grounded on blockchain) systems. The blockchain- grounded voting design has two modules to make the whole design integrated and work together. One will be the Election Commission, which will be responsible for creating choices and adding listed parties and campaigners querying the election under the smart contracts. The other end will be the namer's module, where each existent can cast a vote for their separate assembly constituency, and the vote will be registered on the blockchain to make it tamper-evidence

.

Keywords: Ballots, Evms, Block chain, Election commision

Introduction

In the era of industry 4.0, blockchain is a technology that is quickly gaining popularity. It is extensively utilized in a variety of supply chain management systems, healthcare, payments, business, IoT, voting systems, etc. because of its high security and features [1].

Existing Methods:

Ballot paper

A ballot paper, often known as a piece of paper or a little ball, is a mechanism used to cast votes during an election. The word "ballot" comes from the Italian "ballotta," which denotes a little ball used for voting or a secret ballot cast in the Italian city of Venice. It is a printed form that voters use to register their preferences in a vote. The selections are then totaled, and the ballot is saved for inspection in case the outcome of the election is called into doubt. To record voter decisions, it was initially a little ball. Each voter uses a unique ballot; they are not exchanged.

A ballot is essentially only a piece of paper on which each voter writes the name of their preferred candidate during the most basic elections. Yet, in order to maintain the confidentiality of the votes during governmental elections, pre-printed ballots must be used. In the polling place, the voter places their ballot in a box. In British English, the ballot paper is also known as a paper ballot. The state of Tamil Nadu is claimed to have employed palm leaves for village assembly elections throughout historical times in India, perhaps about 920. Formerly, candidates' names would be written on palm leaves and placed inside a clay pot for counting. This method was known as Kudavolai. Nowadays, they were replaced in most areas [2].

Electronic Voting Machine

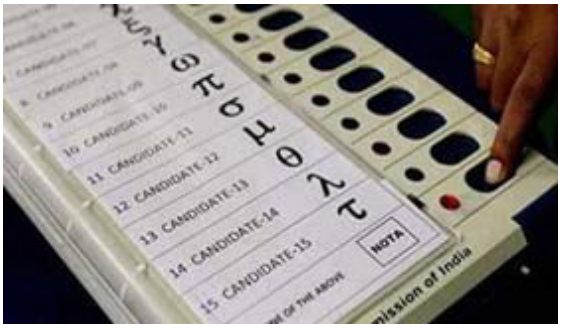

Fig.2. Evm Polling

The ballot voting system has been replaced with electronic voting machines, or EVMs. By simply pressing a button on the voting sign of their favourite candidate during elections, voters in this innovative method may pick the politicians they wish to support as shown in Fig 2.

Bharat Electronics Ltd. and Electronic Corporation of India, which is made up of two units—the control unit and the balloting unit—manufacture EVMs. The control device keeps track of the nation and displays the total number of votes cast in digital format, while the balloting unit allows the voter to cast their ballot by pushing the necessary voting button.

The previous ballot paper voting methods have been replaced by electronic voting machines (EVMs), which has sped up election outcomes by allowing for rapid vote counting. Also, it has decreased the expense associated with the manpower needed for manual vote counting. Also, it has shortened the time needed for voting. Moreover, since these machines are battery-powered and do not require electricity, it also conserves paper and

energy. allowing for continuous voting. As the EVMs have a chip technology that makes it hard to change them, this has also boosted voting system security and helped to thwart fraud.

In addition to these benefits, EVMs are allegedly hacker-prone, which might disrupt the voting process and lead to unreliable election results. In some cases, the software can also be changed to give different election outcomes. During shipping, some of the machines' censors may be harmed or interfered with, which might result in data loss or incorrect findings. Voting machines must be kept in extremely secure safe lockers until the results are announced so they cannot be destroyed or tampered with. Due to the fact that party names are written in English, many people who are physically disabled or illiterate find it difficult to cast their ballots for their preferred candidates. As a result, they must rely on either [3].

Why do we need it?

Voting systems now in use, such as electronic voting or ballot boxes, are subject to several security risks, including DDoS attacks, poll booth theft, vote tampering and manipulation, malware assaults, etc. They also demand a significant amount of paperwork, staff time, and other resources. Existing systems then become suspicious. Long lines during elections are one of the drawbacks.

•Protection Data breaches, vote manipulation, and a lot of paperwork, which makes it less efficient and time-consuming.

• It is challenging for voters with disabilities to go to the polls.

• Election-related expenses are considerable. creation of systems of this nature. Solution: The voting process can be made more dependable, transparent, safe, and immutable using blockchain technology. How? Use this as a case study.

Assume you are a registered voter who casts your ballot using an electronic voting machine (Electronic Voting Machine). However, since it's a circuitry and someone may interfere with the microchip, you could never know if your vote actually went to the politician you intended to support or whether it was misdirected to another candidate's account.

because it is impossible to determine how you voted. Nevertheless, if you use blockchain, it records everything as a transaction, which will be detailed further below. As a result, you receive a receipt for your vote (in the form of a transaction ID), which you can use to verify that it was safely counted.

Now imagine that a digital voting system (website/app) has been developed to digitise the process, and that all sensitive data is kept on a single admin server/machine. If someone tries to hack it or pry into it, they could modify the candidate's vote total from 2 to 22! You

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might not be aware that a hacker has installed malware, used clickjacking to steal or invalidate votes, or has simply attacked the central server.
[4].

If the system is integrated with the blockchain, a unique feature known as Immutability safeguards the system against this. Think about SQL, PHP, or any other conventional database architecture. Votes can be added, changed, or removed. Yet, with a blockchain, you can only add data; you cannot edit or remove anything. Because of this, everything you insert there remains there forever [5].

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But Building a blockchain system is not enough. It has to be decentralized, i.e. if one server crashes or something happens on a particular node, the other nodes can function normally and don't have to wait. victim node's recovery.

Try Free

As a result, the following are the main benefits:

During pandemics Uke COVID-19, when it is physically impossible to have elections, you may vote whenever and wherever you choose. It is also secure, immutable, faster, and transparent.

Let's picture the procedure

Learning something new that has been visually conveyed is always exciting. given below in Fig 3 explains how the blockchain voting works.

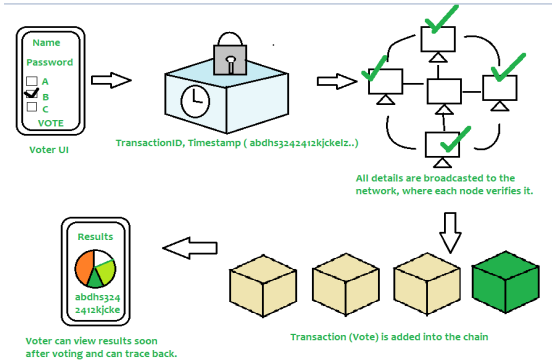

Fig.3. Description

Voters must enter their details in accordance with the picture above in order to cast their ballots. Afterwards, all information is encrypted and saved as a transaction. Next, after being broadcast to every node in the network, this transaction is confirmed. The transaction is recorded in a block and added to the chain if the network authorises it. Keep in mind that once a block is included in the chain, it cannot be removed or altered. Users may now see results and, if they so want, transaction history [6].

Building a system that takes use of the security, convenience, and trust associated in voting is necessary since present voting methods are unable to meet the security demands of the modern generation. Voting systems leverage Blockchain technology as a result to add an additional layer of protection, encourage people to vote at any time, from any place, without any inconvenience, and speed up the voting process [7].

Design methodology

The below Fig 4 design flow diagram will describes the flow of the proposed model.

The design flow diagram that follows will explain how the suggested model would

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operate. The user must first register on the website with the necessary details before being allowed to vote by the admin alone.

With the use of block chain technology, the data will be kept as smart contracts, with unique hash numbers for each user.

Finally, the administrator can monitor the polling's results or progress minute by minute.

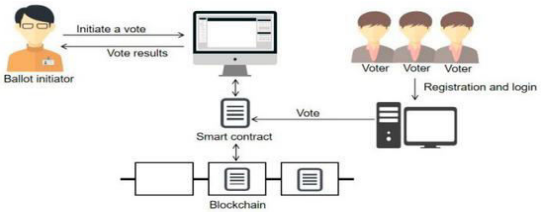

Fig.4.Design flow

System Implementation

•Install Visual studio code on your pc with windows 10 32/64 bit or above

•Write down the code for the website,admin page and user page in your preferred language

•Use truffle for js and merkle tree for python in order to implement block chain technology

•User can register through the website and can cast his vote of his interest

•Admin can conduct polls and authorizes the users by checking their eligibility [8].

Results

Firstly there will be an enrollment page as shown in Fig 5, the users and the administrators can enroll with their details into it.

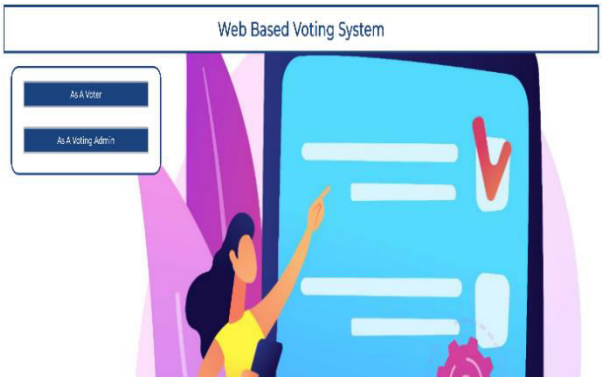

Fig .5.Enrollment Page

Login page is displayed for the user as shown in Fig 6. Here the user can login with his credentials and can cast his vote upon his interest

Fig.6.Login Page

Whenever we are needed to cast our votes we should be authorized by the admin. The admin will give the voting powers to the users after checking their details only as shown in the Fig 7.

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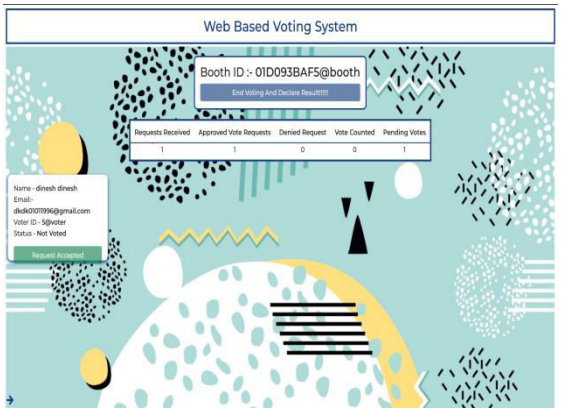

Fig.7.Admin Authorization Page

After conducting the safe and secure polling the admin can check the results or even progress of the polling as shown in Fig 8.

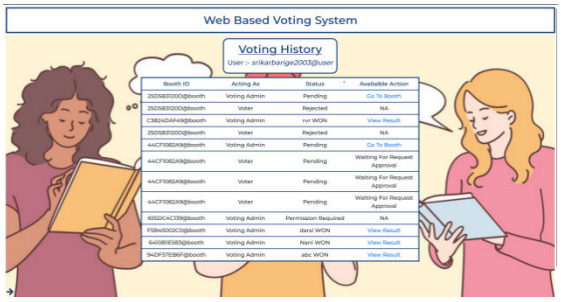

Fig.8.Voting History Page

Future Scope

As everything is being made and use online we are also going through the online based voting system based on the block chain technology.

By using this online based voting we can bring major voting turnover percentage as this will increase many youngsters to motivate to vote

This is also a safe and secure method which will be freed from tampering and regging.

This will be mostly effective on democracy based countries like India.

Conclusion

Democracies depend on trusted elections and voters must have trust in the electoral process for a robust democracy. Traditional paper-based elections, however, do not offer credibility. The concept of modifying digital voting methods aims to boost voter confidence by making the electoral process more affordable, quick, and simple.

The goal of this project is to create an electronic voting system based on blockchain technology that is safe, affordable, and guarantees voter privacy.

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